King Abdullah University of Science and Technology
at Thuwal, Kingdom of Saudi Arabia
جامعة الملك عبدالله للعلوم والتقنية
ثول ، المملكة العربية السعودية

the BEACON

September 2010 / Ramadan 1431
Issue No. 1
www.kaust.edu.sa

NEW HERE?
Then make sure
you don't miss
out on our

ESSENTIAL CAMPUS GUIDE

The places you
MUST find!

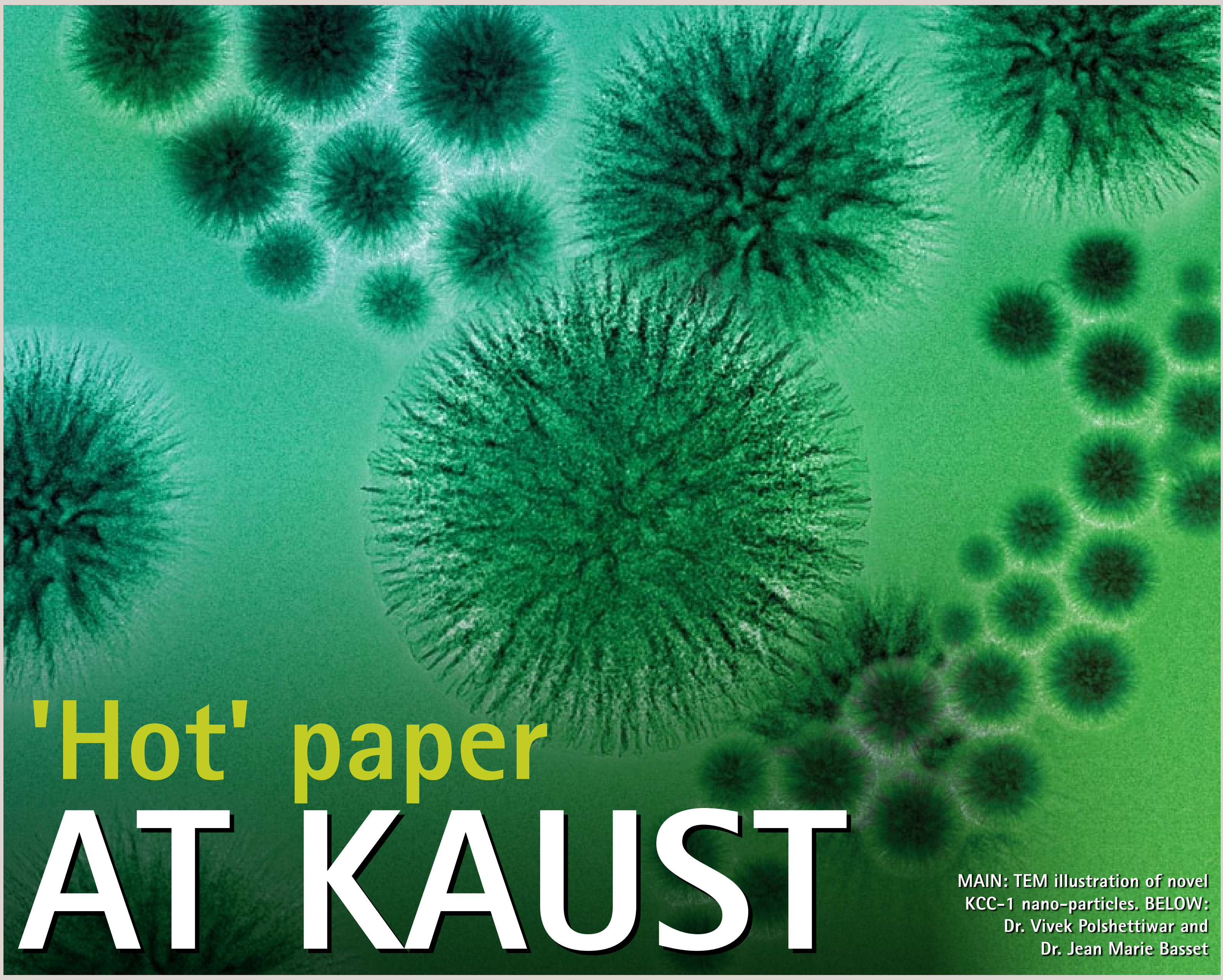
Turn to p.4–5

NADIA BURGER

Welcome, new scholars!

THERE has been a buzz on campus as nearly 700 students from 63 nations and 220 different undergraduate institutions arrive at KAUST to resume their studies or to be part of the new 2010 intake. 10% of this year's postgraduates bring families with them and just over 20% are women. As with the inaugural intake, the student body is varied and includes postgraduates from the Kingdom, the wider Middle East, Africa, Asia, Europe, Australia and the Americas. Of the undergraduate universities represented last year, half have graduates beginning studies at KAUST in 2010. Some of the largest numbers come from King Fahd University of Petroleum & Minerals and King Abdulaziz University, with the remainder coming from institutions as different as the Universidade de Sao Paulo, Brazil; Trinity College, Dublin; and the Institute of Tibetan Plateau Research at the Chinese Academy of Sciences.

Among the great joys and challenges of living, working and studying within KAUST is the cultural diversity it offers; the staff comes from over 66 nations. The Government Affairs Services Center (GASC), located off the central atrium in the administration building, expedites the procedures necessary for visitors wishing to work and live in Kingdom. Its imposing director, Dr. Talaat Al-Qahtani explains that he and his team "are only here to serve you". By working closely with embassies worldwide, the department has reduced the time needed to negotiate student visas from six weeks to five days. ☐



CHRIS KENDALL

'Hot' paper AT KAUST

MAIN: TEM illustration of novel KCC-1 nano-particles. BELOW: Dr. Vivek Polshettiwar and Dr. Jean Marie Basset

RESEARCHERS at KAUST have made a breakthrough discovery in a new family of silica nanoparticles less than a year since the university's inauguration. In a paper published by the prestigious journal, *Angewandte Chemie*, Dr. Vivek Polshettiwar and Dr. Jean Marie Basset, with the help of nano-imaging experts Dr. Dongkyu Cha and others in the imaging core lab, report the discovery of a fibrous nano-silica material, KCC-1. This finding is anticipated to be significant and far-reaching in the world of catalysis and *Angewandte Chemie* has designated the paper "hot".

Dr. Basset, a pioneer of surface organometallic chemistry, is Director of the KAUST Catalysis Center where Dr. Polshettiwar, an expert in the synthesis of novel nanomaterials for green catalysis is a senior research scientist. Catalysis is the acceleration of a chemical reaction induced by the presence of material that is chemically unchanged at the end of the reaction; familiar examples seen in nature include digestion and fermentation. Catalysis is the foundation of today's chemical and petrochemical industry.

In an effort to be a world leader in a multidisciplinary approach called "catalysis by design", the KAUST Catalysis Center searches for advanced inorganic and polymeric nano-materials. Of particular importance to KAUST is that these materials and devices could provide the economic and environmentally benign processing of natural gas and petroleum resources in the Kingdom, as well as creating new resources for energy and environmental sustainability. The strategy of going beyond petroleum is a major challenge to the Catalysis Center. A typical example of sustainability for energy is the splitting of water (sustainable) into oxygen and hydrogen (a new energy vector) under the influence of a photo catalyst and solar light (also sustainable). In the interdisciplinary/project-based approach unique to KAUST, Dr. Polshettiwar and Dr. Basset fused their knowledge and expertise to shape this discovery, working closely with Dr. Dongkyu Cha, an expert electron-microscope imaging and characterization scientist in KAUST's world-class Nano Core Laboratory.

Porous silica is commonly used in industrial catalysis, and silicas with large, easily accessible surface areas are in great demand. The KCC-1 silica nanospheres (fig.2, p.2) have never been seen before, and the combination of large, accessible surface area and fibrous surface morphology, due to the presence of a kind of dendrimeric silica fibers and their respective channels as opposed to pores (fig.1, p.2), will enhance the accessibility of available surface area. Coupled with good thermal, hydrothermal and mechanical stability, their allure increases considerably. It is by rethinking chemical design from the ground up, using the principles of "catalysis by design" rather than relying on pure serendipity, that chemists like Dr. Polshettiwar (who came here from the US Environmental Protection Agency) are developing new environmentally friendly ways to manufacture products. He believes that KCC-1 will lead to the development of efficient, selective and stable catalyst systems that are truly green.

(Continued on p.2)

INSIDE:
News 2–3
Campus 4–5
Interview 6–7
Technology 7
Community 8

Welcome to THE BEACON!

WELCOME to the first issue of *The Beacon*. This newspaper has been launched to keep every member of the university community informed of current issues as well as all the interesting events that make time spent at university so memorable. We'll be reporting regularly on aspects of the exciting academic research being conducted here. We feel privileged to have the task of recording the historic growth and development of this fledgling university. We look forward to hearing from you with your comments and suggestions for future stories.

- THE BEACON Editorial

……

Write to us at thebeacon@kaust.edu.sa

The Beacon, Issue 1, September 2010. Published by The Communications Department, **King Abdullah University of Science and Technology**, Thuwal 23955-6900, Saudi Arabia. Contact Salah Sindi T +966 (2) 808-3221, email *salah.sindi@kaust.edu.sa*, or Christopher Sands at T +966 (2) 808-3228, email *christopher.sands@kaust.edu.sa*

© King Abdullah University, of Science and Technology. Printed on partially recycled paper.

'Hot' paper
AT KAUST

(Continued from p.1)

So what exactly are the implications of this invention? Catalysis has a huge impact on the industrial, agricultural, and consumer sectors, and catalysts are enablers for a broad range of devices including sensors, fuel cells, exhaust gas converters, and water purifiers. The production of 90% of all common chemicals involves catalysis in an industry estimated to be worth $900 billion in 2005. Quite apart from KCC-1's catalyst applications, its uses in filtration (including industrial and municipal water treatment) and in the separation of chemicals in gas or liquid chromatography are being explored.

This significant discovery furthers KAUST's economic development mission as it could bring significant commercial benefits to several industries including oil and gas. Although the starting/seed template material for the production of KCC-1 is relatively expensive, the inventors believe that the overall process is not. Ideally the nano-silica would be produced in the Kingdom, thus creating local employment opportunities. The KAUST Office for Technology Transfer & Innovation has already filed Patent Corporation Treaty and US patent applications and soon will fill a GCC patent application on KCC-1. Several major companies are eager to examine and test the materials and license the patent rights from KAUST.

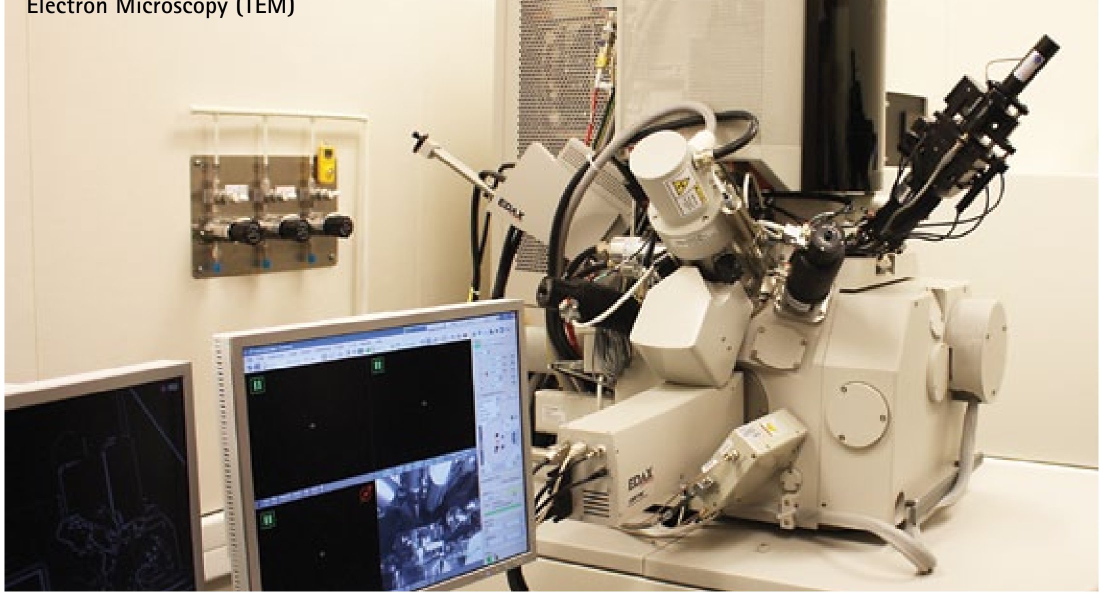

The Focused Ion Beam (FIB) system with nanomanipulator used to prepare thin slices of material for Transmission Electron Microscopy (TEM)

Fig.1

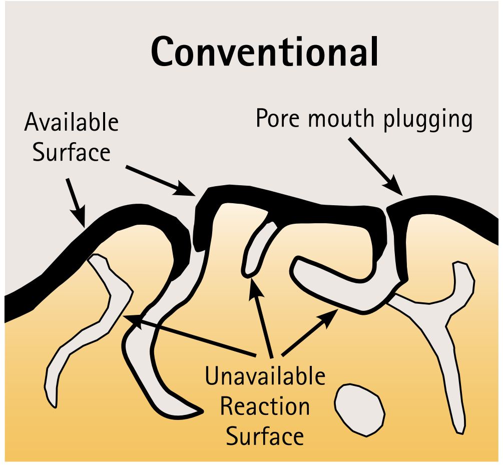
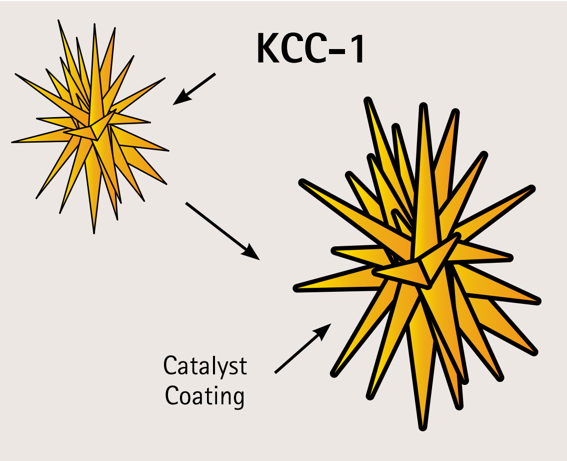
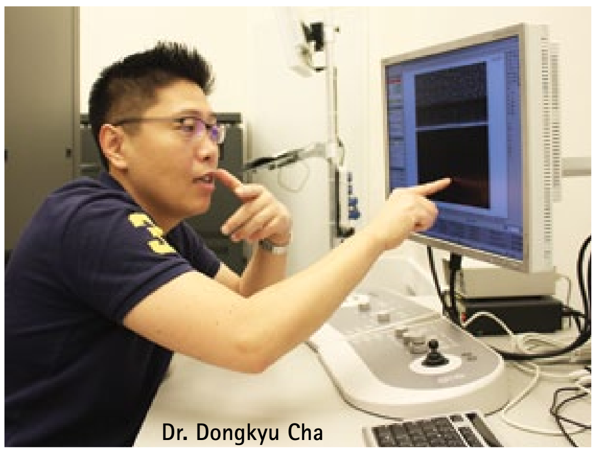
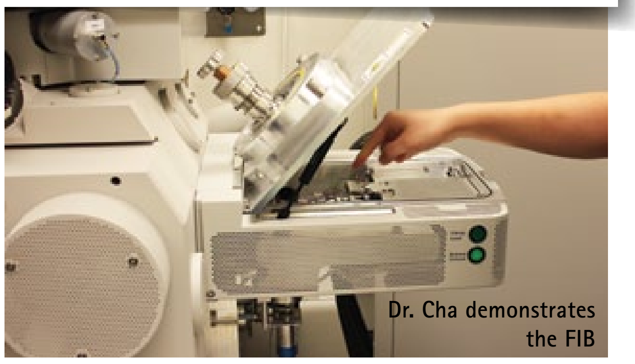


Fig.2



TEMs MADE IT POSSIBLE


Dr. Dongkyu Cha


Dr. Cha demonstrates the FIB

Dr. Dongkyu Cha was attracted to KAUST by the comprehensive state-of-the-art facilities offered by the Imaging and Characterization Laboratory as well as the opportunity to work across disciplines at KAUST, to collaborate with institutions worldwide and to pursue his own research supported by the university. A South Korean, he came to KAUST with his young family less than a year ago from the University of Texas at Dallas and this is the first time he has worked closely with chemists. Dr. Cha and Dr. Polshettiwar planned their research looking closely at how the synthesis of the nanosphere altered the resulting structure. Dr. Cha explained that often nanoscale manipulation of a substance not only reduces volume and increases the surface area to volume ratio, but also changes its intrinsic properties and so the mechanical and thermal stability of KCC-1 is particularly gratifying.

A Transmission Electron Microscope (TEM) overcomes the limits of the wavelength of light by using electrons as its illumination source. Their much lower wavelength makes it possible to get a resolution a thousand times better than with a microscope that uses light. As an analogy, the magnification of about1 million of the Titan Cs corrected TEM at KAUST (one of 6 TEMs in the core facility) is equivalent to being able to stand on the moon and see the veins on a leaf on earth with the naked eye. The beam of electrons travels through a vacuum in the column of the microscope to pass through the thin specimen (usually less than 100 nm) being examined to give a projection image with atomic resolution. When the electron beam is focused onto a tiny probe, sub-nanometer chemical analysis can be achieved.

The TEMs at KAUST are built in a cube system to ensure that environmental effects such as acoustic-caused vibration and ambient temperature variations do not interfere with imaging. □

In Brief

THUWAL NEWS

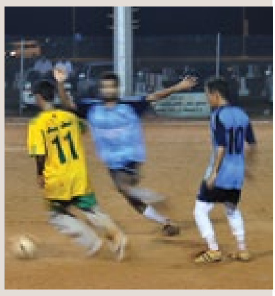


PHOTO CREDIT

27 Sha'ban-20 Ramadan are the dates for the KAUST-sponsored football tournament. The event is designed to increase ties with the youth of Thuwal and the area villages. Sport, competition and suhoor activities reinforce the effectiveness of this event. Head-hunters for football clubs are usually present, adding to the excitement. Other valuable sponsors include Saudi OGER, SALCO, and Nesma.

JAPAN DAY

KAUST will host a Japan Day, organized by the Japan Saudi Arabia Academic Center (JSAAC), on September 25th. It will be include a two-day course for KAUST students, faculty and staff looking at the successful Japanese model of technology management and innovation. The Japan Day presentations will offer a glimpse into the Japanese way of life with a display of Japanese clothing, food and photographs. The highlight will be a demonstration of the intricate Japanese tea ritual.

CONVOCATION SEPTEMBER 5TH

President Shih will host KAUST's first *Academic Convocation* to be held in the afternoon of September 5. Commemorating the day that KAUST's very first class was held, the Academic Convocation will celebrate a significant milestone in KAUST's history. All faculty, post docs, students and academic administrators are expected to participate in this important event. President Shih will address the gathering and share his perspectives on our progress as a community of scholars and our future as we move forward to realize our aspirations as a University.

MAIN: His Highess Prince Faisal bin Abdullah, the Saudi Minister of Education, and delegation visit The KAUST School in May. TOP LEFT: A jubilant group of children from The KAUST Elementary School. INSET BOTTOM LEFT: HH the Saudi Minister of Education. INSET BOTTOM RIGHT: Meghan Harris, Secondary School student addresses the delegation.

KAUST SCHOOL GETS TOP MARKS

FOUR weeks ago, 27 recently hired teachers took up their new positions at The KAUST School. At the orientation, they met some of their 74 veteran colleagues who have been working at the school since last September. Reflecting the diversity of the university, the professional staff members come from countries all over the world including Australia, New Zealand, India, Canada, Kuwait and South Africa.

US-born Madeleine Hewitt, the School Superintendent, was delighted to share two significant achievements for the school: authorization for the International Baccalaureate (IB) Programme, and Ministry of Education approval in the Kingdom.

The International Baccalaureate is a world-renowned program with rigorous authorization standards and requirements. Most schools consider adopting the IB after many years of service, so expectations were mixed when a visiting team from the IB Office in Geneva initially came to inspect the school. This was followed by an extensive review of documentation, a number of surveys, a number of visiting interviews and more. There was much joy for all at school when in May the letter with an unconditional authorization for students in The KAUST School to participate in the IB Diploma Programme arrived. As the staff had less then 10 months to prepare for such a rigorous analysis of the school, this is an extraordinary achievement

The authorization allows the first cohort of grade 11 students to begin the two-year course of study in pursuit of an IB Diploma, a recognized gold standard for college entrance worldwide. What exactly is the IB Diploma Programme? Students aged 16-19 study six courses at higher level or standard level. They must choose one subject from each of the five groups encompassing a first language, second language, social studies, the experimental sciences and mathematics. The sixth subject may be an arts subject chosen from a sixth group, or the student may choose another subject from among the core subjects. Three of these subjects are chosen for study at a higher level.

In addition the program has three core requirements that are included to broaden the educational experience and challenge students to apply their knowledge and understanding. These are the Extended Essay, the Theory of Knowledge Course and Creativity, Action, Service.

IB students are charged with being active, compassionate and lifelong learners. They are encouraged to create a better and more peaceful world through intercultural understanding and respect. To support the students, The KAUST School will develop challenging programs of international education and rigorous assessment.

It is interesting that many of the school students have made connections between the IB mission and the greater vision of King Abdullah to build a modern form of the historical "House of Wisdom" founded in Bagdad centuries ago.

APPROVAL FROM THE SAUDI MINISTRY OF EDUCATION

An equally noteworthy moment for the School came on May 22nd when His Highness, the Saudi Minister of Education, accompanied by a delegation of 21 Saudi educators visited the school. This visit resulted in the approval and licensing of The KAUST School within the Kingdom. Saudi Ministry approval means that students at The KAUST School will be recognized and supported as they matriculate back into Saudi schools and/or go on to universities in the Kingdom.

When the Minister and his delegation gathered with the students to learn more about their experiences in school, one of the students commented to the delegation, "*Here, we are really asked to think.*" Her friend added, "*We are really asked to learn, and we do learn here.*" These words were as precious to the teachers as any of the letters of approval. ☐

"Saudi science to break the mold"

AN article in the August edition of The Royal Society of Chemistry's magazine *Chemistry World* reflects positively on the first year of the King Abdullah University of Science and Technology. Acknowledging the impressive facilities, writer Sarah Houlton interviews KAUST's Vice-President for Research, chemist Dr. Jean Fréchet. Recently appointed from the University of California at Berkeley, he relishes being part of the team "creating a world-class science and technology research institution from scratch". Calling modern science "an interdisciplinary affair", the article describes KAUST as being organized "in an entirely different way – around research projects rather than subject-themed departments."

Frechet is excited. "It's multidisciplinary to start with.... we will go all the way from fundamental research to a start-up company, all of this with the resources right here at our disposal". ☐

The 5 buildings you

THE STUDENT CENTER

A

NADIA BURGER

The Student Center is located at the Discovery Square end of the spine and offers a one-stop spot for many student-related services to support your academic, personal, and professional development.

On the second (ground floor) level you will find the Graduate Student Skills Lab (GSSL), the Professional Development Office, Recreation and Involvement, and the Residence Life Office. The GSSL offers courses for those who wish to improve their English through listening, speaking, reading and writing. Graduate students can also take math courses.

Nearby is the Professional Development Office (PDO) offering the opportunity for postgraduates to explore internship and career options during and after graduation. The PDO provides help for all students in developing their employability skills, including cv/resume critique, interview preparation and career planning. Its staff offers individual consultations and workshops on a wide range of professional development subjects. The PDO services are also available online, via an intranet platform, “Symplicity”, allowing students and alumni to access information designed to help them find professional opportunities.

Next to the PDO are the Recreation and Involvement Services, focused on the provision of educational, cultural, social, and leisure activities to help balance research and classroom demands. Recreation and Involvement Services offer unique opportunities to get involved in activities and clubs. Whether your aim is fun, fitness or achieving your true leadership potential the Recreation and Involvement Services helps you to make the best of the facilities whilst you are here.

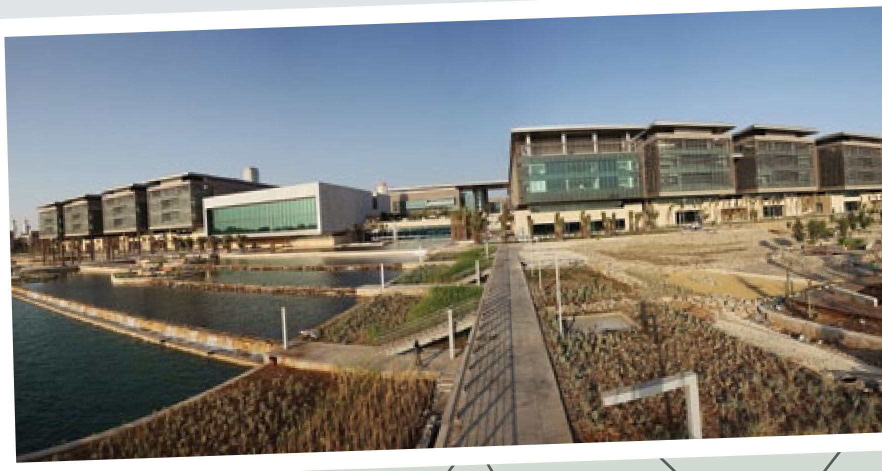
On the third level you will find the Admissions and the Scholarships Offices providing support services for the university's recruitment strategy. Their key roles include student recruitment, national and international scholarship administration, specialist support services, and relationships with overseas partners.

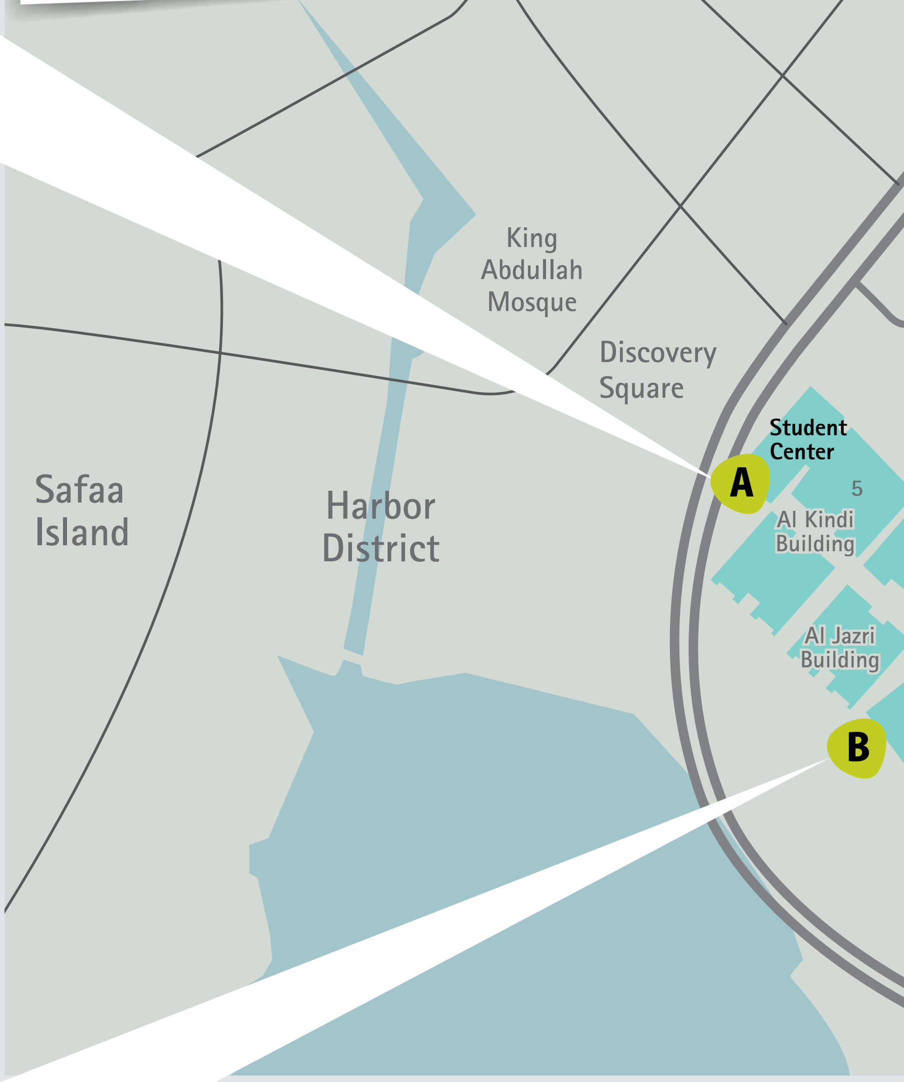
On the fourth floor is Health, Wellness and Counseling, Graduate Development and Support as well as the Student Recreation Center, all dedicated to facilitating your physical, emotional, mental, spiritual, social and environmental well-being. The Health, Wellness and Counseling Services are designed to help students with specific personal challenges, including but not limited to stress, loneliness, academic and personal anxiety and homesickness. These services also offer support and advice to students with special needs including mobility limitations, specific learning difficulties, mental health issues and long-term health conditions.

We at the Student Center welcome you and look forward to helping you feel connected as well as supported in the engaged and vibrant community you have just joined at KAUST.

Contact: T +966 (2) 808-3434, email graduateservices@kaust.edu.sa

DID YOU KNOW?
There is a games room on the 4th floor of the student center





CAMPUS LIBRARY

B

The library is a distinctive building looking on to the Red Sea in the heart of the campus near the Administration Building and Dining Hall. Open 24/7, and manned 8am- 8pm Saturday to Wednesday, late-night types can even help themselves to a tea and coffee service while they catch up on their reading. But do people really use the library through the night? The answer is “Yes”, according to Library Director Joseph Branin.

“This is very popular place with the students,” he said. “We often have 50 to 100 in the building at one time, and I’ve been in here late at night or very early in the morning and there have been groups of students working away."

Much of the collection is digital and can be accessed on the 150 Apple iMac workstations in the building or from anywhere with Internet access, though the library has nearly 10,000 print titles and plans to add a similar number each year.

“There was talk when we were designing the library that we might be entirely paperless but that’s just not practical yet,” added Mr. Branin. “There’s still a demand for paper and only about 20 per cent of the textbooks we purchase for students and faculty are available in digital form."

“The policy is to collect in support of the curriculum and research of the faculty and students, but we are building some special collections including one on the Red Sea - aiming to have a copy of everything ever written about it including its history and its science.”

And if the book chapter or paper you need is not in the collection the library can obtain it for you through its document delivery service.

Online collections: More than 10,000 online journals, over 30,000 e-books and reference works, a comprehensive range of scientific databases, two million scientific images and dissertations and theses from around the world.

Facilities: Seating for more than 400, 20 collaborative learning rooms, computer learning lab, quiet study area, copy center, Sea View meeting room, Coffee Republic.

Services: Reference consultations, information desk, library skill training, customized email alerts and citation management services.

Contact: T +966 (2) 808 3630, email library@kaust.edu.sa

DID YOU KNOW?
10,000 – number of new books the library plans to buy each year

THE DINING COMMONS

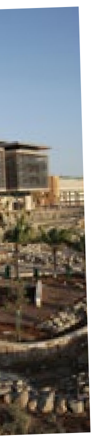
The Dining Commons is situated on the lower level between the campus sea steps and the main campus mosque. The dining hall seats 700 and currently serves about 1,600 meals each day. It comprises the food service area and several distinct spaces to eat, most with views of the Red Sea and the beacon. It is open 24/7 for “grab and go” food, with breakfast served between 5:30am and 9:30am, lunch between 11am and 3pm and dinner between 5pm and 9:30pm. In Ramadan, sohoor is served between 1:30am and 3:30am.

Stations within the food hall offer a variety of meals and snacks, all freshly prepared in the extensive campus kitchen. Main courses are drawn from traditional regional and international foods. There is a health counter where dishes can be prepared using the ingredients chosen by the diner and are cooked in canola or olive oil, a wok-at-work, a fresh pasta station, and a grill station offering meat and fish grilled to personal specification. Sandwiches and Greek and caesar salads can be mixed to order at the deli counter.

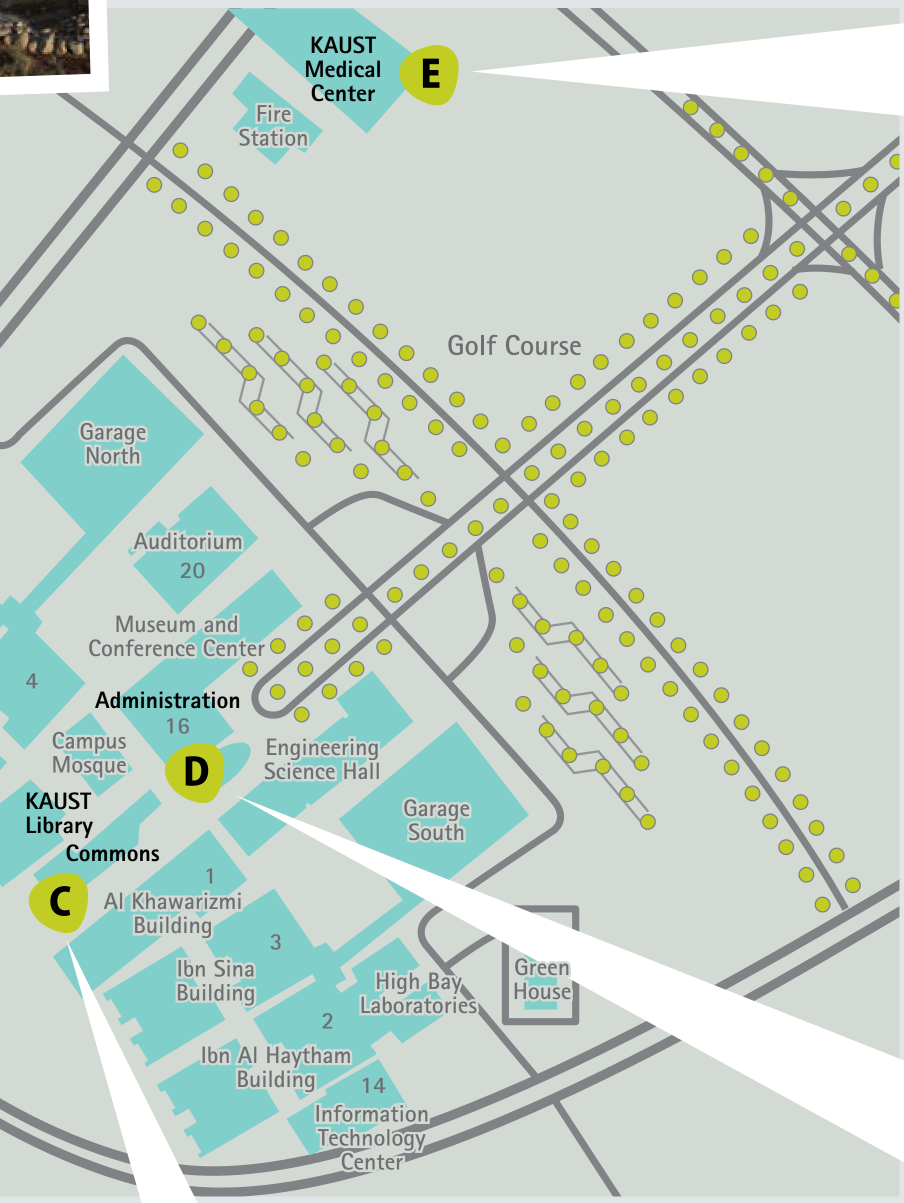
The team includes chefs from Sri Lanka, India, Pakistan and the Philippines, from the GCC countries including Jordan, Lebanon, Syria and Egypt as well as from New Zealand and Canada. They are soon to be joined by others from Indonesia, Turkey and Malaysia.

OTHER NUMBERS TO KEY INTO YOUR MOBILE NOW: GOVERNMENT AFFAIRS: T (054) 470-1111, M (054) 470-1111; **KAUST MEDICAL CLINIC:** T 808-4111, M (02) 808-4111; **KAUST SECURITY /**

NEED TO KNOW



New around here? Then the yacht club and sports stadium can wait . . . these are the places where you can find the people who can smooth your path



C

Healthy eating is a priority in the commons where ingredients are chosen carefully to provide balanced meals and the use of hydrogenated fats is monitored. KAUST sources food locally when possible and demands best industry practices in their kitchens. All staff are trained and certified and the kitchens and staff regularly undergo audit. The staff is keen to receive feedback (there is a suggestions box in the food hall) to better help the community meet its needs.

There are plans to use some of the dining hall to offer a weekly Lebanese a la carte menu in a more intimate setting as well as to add equipment including a tandoori oven, a shawarma spit, a chicken rotisserie and an outdoor barbecue facility in the future.

The Dining Commons accepts only cash. There is an ATM near the elevator on the same level.

Contact: T +966 (2) 808-3990, email okadouh@al-tamimi.com

DID YOU KNOW?
More than 850,000 meals have already been served on campus

KAUST MEDICAL CENTER

E

The KAUST Clinic stands on Unity Boulevard between the Fire and Gas Stations. It is distinguished by its stonework sign and has ample parking next to the building. Housed in the clinic are the medical, dentistry and physiotherapy services, as well as a laboratory, a pharmacy and X-ray facilities.

The Medical Clinic is staffed by professionals from the International Medical Center (IMC) in Jeddah, which is the primary health service provider and is where patients are referred for specialist consultations and for admissions including surgery. All doctors on campus are fluent in Arabic and English and have American, Canadian or UK medical board certification. Together, the two Family Physicians, the two Obstetrics and Gynecology Specialists and the two Pediatricians see nearly 3000 patients registered here at KAUST. The clinic is open from 8am to 4pm Saturday to Wednesday and from 8am to 1pm on Thursday. Same day appointments can often be made on the day of the call.

If an individual needs to go to the IMC, the KAUST Patient Coordinator working at the clinic will help facilitate appointments, referrals and admission procedures as well as with the discharge procedures.

There is a fully staffed 24/7 emergency service provided at the clinic. Should a patient require emergency treatment above and beyond what is provided on campus, he or she will be stabilized at the clinic before being transferred by ambulance to Jeddah.

No less than 45 babies have been born to campus families in the last year, to parents who come from 18 different countries. All babies and children are immunized according to the aligned Ministry of Health (Saudi Arabia) and World Health Organization schedules.

A dentist at the clinic sees patients daily, working closely with hygienists. He is much in demand, and appointments need to be planned some weeks ahead. It is hoped that another dentist will soon join the clinic.

Emergency number: T +966 (2) 808-4444
Appointments: T +966 (2) 808-4111
Email: patient-relation@kaust.edu.sa

DID YOU KNOW?
So far 45 KAUST babies have been born to parents of 18 nationalities

THE ADMINISTRATION BUILDING

D

The Administration Building is distinguished by its architecturally stunning Rotunda, which lies on the straight line between Main Gate 1 and the beacon. It is still sometimes called Building 16. Most guests enter the building at the Rotunda, which is actually level 2 of the building, but let's start at the top:

LEVEL 4 is where you will find the university Senior Leadership Team on the west side of the building, overlooking the harbor. This floor is frequently the reception area for guests and important visitors to the University. On the east side of the 4th floor are the staff of the President's office, as well as the office of University Development which helps the university strategize how it engages with corporate and other sponsors or donors in support of KAUST objectives. The legal team of General Counsel is there and nearby, the support staff of the SVP Economic & Technology Development. At the far end is the Chief Financial Officer, the VP for Research and senior administrative staff from the Provost's office.

LEVEL 3 of the building houses the Finance Department on the west, sea facing side, as well as the University Policy Office and the Academic Budget and Planning staff from the Provost's office. On the east side of the floor is the Procurement department, which deals with contracting & purchasing. At the end of the passage, you will see the signs for Human Resources, where their Personnel Relations unit handles inductions of new faculty and staff. Most personnel will visit HR at some stage of their employment. Payroll is also there, and close by is the Relocation team. At the far northwest end you will find Internal Audit and the Museum personnel, who are on hand to take groups through the Museum downstairs.

LEVEL 2 can only be accessed from the outside through the Rotunda. Across the open floor area is the coffee shop with places to sit at small tables. This open plan floor is a hub of activity within the building. The well-used Government Affairs Service Centre is on the west, sea facing side, dealing with all community members needing visas and any other interaction with public sector offices in the kingdom. On the other side is the Communications department, which handles internal and external publicity, the website, and co-ordination of university functions.

LEVEL 1 is partly below ground, and here you will find the Campus Support team, who are responsible for the infrastructure within the "horseshoe", from office layout to Laboratory infrastructure. At the same level are a large section of underground parking (south east) and an undercover open area.

LEVEL 0 is partly a parking area, but also houses the vital Mailing department, which handles the University's incoming and outgoing post. Level zero is also generally referred to as "the spine", an inter-connected maze of passages that allows heavy vehicles to bring in equipment and chemical supplies to our laboratories, without disturbing activities.

The King Abdullah Boulevard runs from Main Gate 1 through a security boom right up to Building 16, with a regularly used bus stop directly outside the entrance to the Rotunda. On the other side, the building is recessed back from the Harbor, but overlooks the central quad behind the Library, and out toward the beacon.

DID YOU KNOW?
This was the first building to open on the horseshoe

EMERGENCY: T 911, M 02 808-0911; **OFFICE AT THE MAIN GATE:** T 808-5963, M 02 808-5963; **CAMPUS INFO/HELPDESK:** T 959, M (02) 808-0959; **TAXI SERVICE:** T 808-5624, M (02) 808-5624

RED SEA: An untapped resource

"CORALS are truly wondrous organisms!" Despite the late hour and the capriciousness of the Skype line, the enthusiasm and delight in Christian Voolstra's voice is infectious. Calling from California, Dr. Voolstra, an evolutionary biologist from Germany has no doubt that "If you want to do marine genomics, KAUST is definitely one of the best places in the world."

Dr. Voolstra is an assistant professor at the Red Sea Research Center headed by James Luyten, Professor of Marine Science at KAUST and Director Emeritus of the Woods Hole Oceanographic Institution. Marine researchers at KAUST enjoy a campus of which over half (19.6km2) is marine habitat. They take advantage of access to the longest reef in the world in a sea the size of Iraq with an unprecedented diversity of marine species. In stark contrast to many other coral reefs, this Saudi Arabian ecosystem has been almost unaffected by tourism. "The 20km stretch of reef at the Gulf of Aqaba, for example, is subject to more than 250,000 dives annually", Chris tells me.

In a nutshell, reef corals are animals that live in a mutualistic relationship with photosynthetic algae: they use carbon fixed by their algal symbiont for calcification and to meet their daily metabolic needs. Without the colorful algae, corals become pale or 'bleached'. Prolonged bleaching can lead to coral death, which in turn affects many other marine species, for example the many fish that use coral reefs as a nursery.

Recently a team of international scientists used a process very similar to tree ringing, taking samples from stony, reef building Red Sea corals and looking carefully at how growth correlates with temperature in a study funded and facilitated by KAUST. In a paper published in Science, the researchers were able to show the effect of climate change on corals from reefs in the central Red Sea and warn of further deterioration within this century without immediate, aggressive global intervention to reduce carbon emissions.

> "CORALS ARE TRULY WONDROUS ORGANISMS! "
>
> RESEARCHER
> **DR. CHRISTIAN VOOLSTRA**

Dr Voolstra has recently been awarded a Global Collaborative Research Academic Excellence Alliance (AEA) grant by KAUST of about $500K over two years in order to sequence the genome of an algal coral symbiont. This research is particularly exciting because, quite apart from helping to understand the mutually beneficial relationship (symbiosis) between algae and coral, it could also help to fathom the destructive parasite/host symbiosis in malaria. Malaria causes 2.7M deaths annually worldwide and interestingly, these algae are closely related to apicomplexans, the agents of malaria. The award serves to complement the efforts of sequencing a coral genome led by Dr. Voolstra and Dr. Timothy Ravasi, Associate Professor of Biology.

Dr. Voolstra cites this AEA award as one example of the inter-institutional collaborations encouraged by KAUST that allow researchers to share ideas and guard against isolation, and praises the interdisciplinary agility facilitated by the research center system that helps to speed up the rate of scientific discovery.

Dr. Voolstra's recent announcement of the genome sequencing of an algal symbiont caused an immediate response when it went into the public domain on "Coral List", an open source initiative pertaining to coral reef ecosystem research, conservation, and education, of which he is a leading proponent.

Using the untapped resource of the fragile and beautiful Red Sea reefs, Dr. Voolstra sees its preservation as paramount, but it is evident that his research could have significant implications for human health. One application is "blue" biotechnology: the characterization of yet to be identified microbial organisms that live in coral reefs and that display antibacterial or antiviral activity. Similarly, the more familiar forest biotechnology has given cancer sufferers hope in the drug Taxol.

One day soon, working with colleagues from the immersive visualization core facility, he hopes to "swim" in a 3D virtual reconstruction of the coral reef in CORNEA, a specific example of the cross-disciplinary projects that the KAUST model aims to promote.

SCHOLARS HELP PROTECT A FRAGILE BEAUTY

A TEAM of graduate students and faculty at KAUST has been awarded funding by the President's Seed Fund Committee to develop a software application of the natural resources in the Red Sea.

The application will have a website interface which will showcase and analyze data to create 3D interactive images, bringing together all the paper data available and building a rich database of the natural resources in the Red Sea. The application will also provide a collaborative interface that will allow research colleagues to share data and update the database electronically. Marine Science scholar Fahmi Machda and his team call this innovation the Red Sea Biogeographic Information System (RBIS).

Machda, who is Indonesian, hopes to be among KAUST's inaugural Master's graduates in December 2010, said: "The Red Sea is beautiful, fragile and unique. Our prototype is to develop up an application that will give people the big picture of what is happening in the Red Sea, with visualizations, maps and charts. The same theory could be used for any environmental project, such as city planning, forestry, flood prevention, and conservation."

FROM LEFT TO RIGHT: Noru Moreno, President Shih, Fahmi Machda, Mohammed Salaha, and Dr Christian Voolstra

The first phase of funding will allow Machda, along with Noru Moreno and Chandra Prasetyo, (all supervised by Dr. Christian Voolstra), to set up their initial base in the Kingdom.

The team will be testing out the RBIS with a volunteer group at the Red Sea Research Center. Machda added: "Our prototype could be put to good use in developing countries. KAUST has influenced me to think more about what I can give." He quotes King Abdullah's example in funding KAUST as his inspiration.

HELP FOR INNOVATORS WHO MEAN BUSINESS

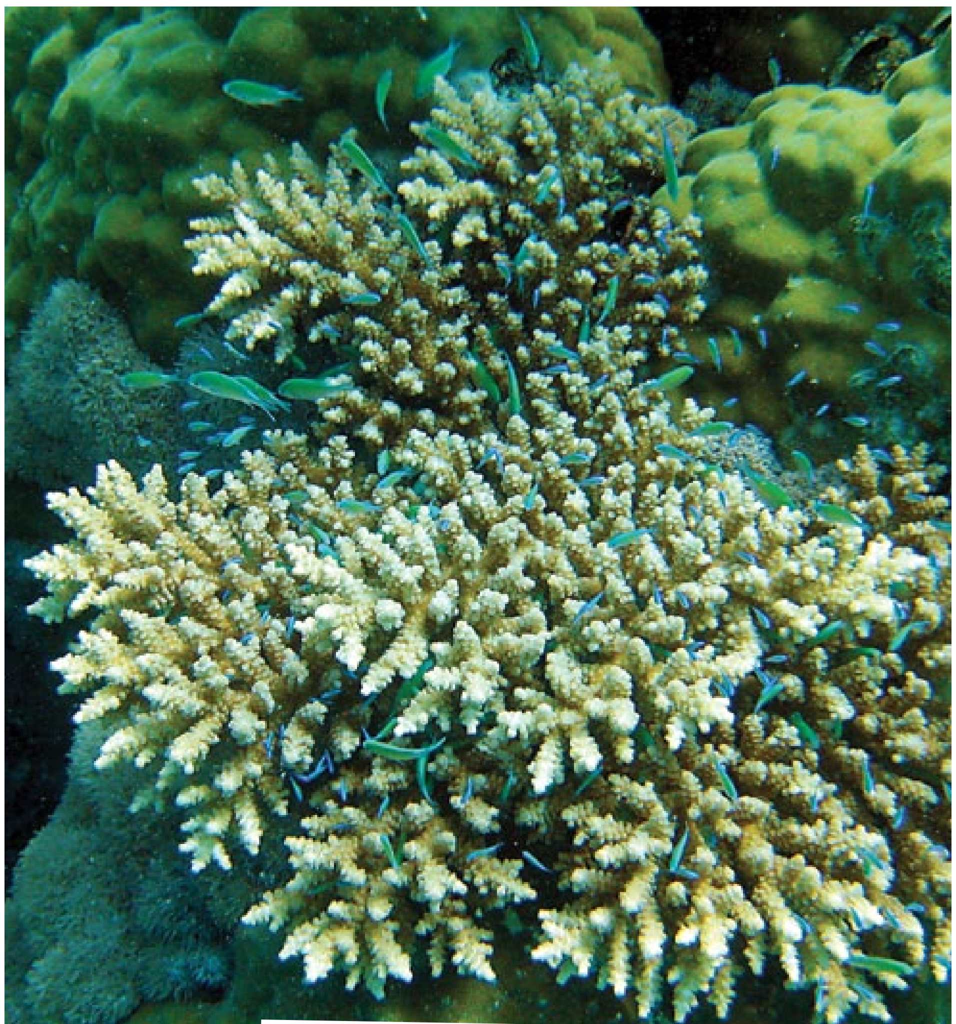
The first eight recipients comprising graduate students, faculty and staff shared a total of $988,000 and received additional in-kind funds from the university to cover administration costs.

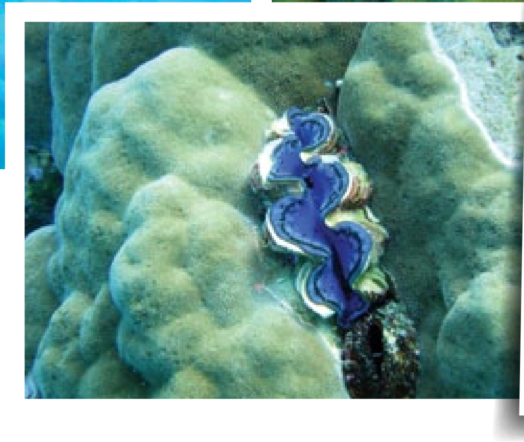
Applications for the second round of grants closed on July 30th 2010 and awards will be formally announced at the Gala Dinner on October 4th 2010.

Inquiries about round three of the Seed Fund Program, to open on September 1st 2010, should be sent to seedfund@kaust.edu.sa. ☐

……

Further information is available at www.kaust.edu.sa.





FAR LEFT: Dr Christian Voolstra in his lab. **MAIN:** Dr Voolstra diving in the Red Sea. **RIGHT:** Examples of Red Sea flora and fauna.

MARINE RESEARCH ATTRACTS MOA FUNDING

KAUST researchers are collaborating with counterparts at other Saudi universities and the Ministry of Agriculture (MoA) in KSA to measure the level of contaminants in edible fish in the Red Sea. The study, funded by the ministry, is the first externally funded project at KAUST spearheaded by its Marine Core Laboratory. Fish samples are collected from selected sites off the coast of Jeddah and from fish markets in the city for the examination of microbial and chemical contamination. It is well known that the higher up the food chain and the longer-lived the animal, the higher the levels of toxins such as heavy metals including mercury and cadmium pesticide residues may be. These chemicals when ingested, particularly by pregnant women and young children, can have a negative impact on health. KAUST scientists, under the direction of Dr. Zenon Batang, are working closely with researchers from Princess Nora Bint Abdulrahman University in Riyadh and King Abdulaziz University in Jeddah to assess the levels of contamination and potential health risk associated with the consumption of contaminated marine fish. Results of the study will allow the ministry to institute sound management responses to marine pollution and may lead to the formulation of nutritional guidelines that can be adopted nationally. It is one example of scientific research that will benefit the region, fulfilling one of the missions of the university.

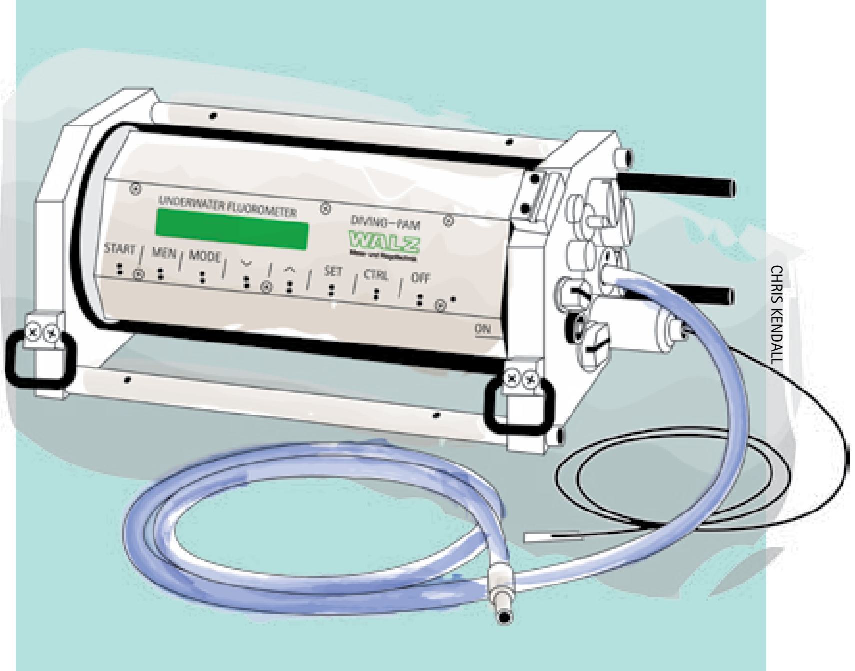
The Aegaeo, one of the expedition vessels used

Dr. Abdulaziz Al-Suwailem

Dr. Abdulaziz Al-Suwailem, Manager of the Coastal and Marine Resources and his colleagues have been responsible for the logistics and operations of two major research expeditions in the Red Sea and many coastal surveys. Some significant Red Sea discoveries were made during these expeditions including the cold brine seep system at about 850 m deep not far from the KAUST campus: a shallow brine pool that is twice as salty as the surrounding deep-sea water. As captured on video fixed to a remotely operated vehicle, the brine pool seems to be a "sea under the sea", with its own "beaches" on the ocean floor. Organisms living along the edges of the brine pool are of particular interest, as they seem to feed on the bacteria thriving on the soup of chemicals within the pool and are totally independent of sunlight for energy. The expeditions also catered to studies that aim to identify novel microorganisms which may host new biochemical intermediaries, proteins or enzymes that are of value to the pharmaceutical industry and furthermore, may possess new biochemical pathways for energy capture and nutrient assimilation. ☐

LAB GEAR

This month we take a look at one instrument that makes Dr Chris Voolstra's research possible - the DIVING-PAM



CHRIS KENDALL

DIVING-PAM, AN UNDERWATER FLUOROMETER

WHEN Dr. Chris Voolstra goes out to the reef, he not only takes a buddy, but also a Diving-PAM Fluorometer. This instrument, produced by the German company, Walz, measures *in situ* the rate and efficiency of photosynthesis of underwater plants, including micro-algae in corals in order to evaluate their metabolism; that is how well they are converting the energy from sunlight into sugars.

Yes - algae literally glow! All plants receive radiant energy from the sun and use it to convert carbon dioxide and water into sugars in a process called photosynthesis. Chlorophyll absorbs light energy and uses most of this energy to do photosynthetic work, but a small portion is re-emitted as fluorescence. The traditional way to measure rates of photosynthesis in plants is to place them in a transparent, illuminated container and measure the rate of oxygen generation. Measuring photosynthesis for underwater plants *in situ* like this is extremely difficult, so the Diving-PAM method measures the fluorescence of the chlorophyll present in the plant.

Fluorescence occurs when an object or substance is irradiated with light of one wavelength and re-emits the light energy at a different, longer wavelength. The Diving-PAM delivers very short pulses of light, which are modulated (amplitude varied) in the shape of a sine wave – hence pulse amplitude modulation (PAM).

The underwater plant just "sees" the sinusoidal variation of light intensity, and the resulting fluorescence is measured by the fluorometer. By measuring the fluorescence before and after short pulses of high intensity light (which effectively saturates the photosynthesis reaction), the efficiency of the photosynthesis can be determined instantly. ☐

ABDULGAFOOR ABDULHALEEM, PHOTOGRAPHY SDG

PHOTO OF THE MONTH

HERE'S OUR CHOICE . . . CAN YOU DO BETTER?

EVERY month *The Beacon* will showcase the work of one of the many talented photographers on campus. We couldn't resist kicking off the Photo of the Month spot with this photo of our youngest community members enjoying a field trip to the labs. But we're sure YOU can do better. Submitted pictures should be relevant to the university but we're not just looking for shots of the campus buildings. We want your unique, imaginative take on things, whether you photograph researchers at work in the labs, a stunning sunset, something that strikes you as funny or a lively sports event. So fire up iPhoto and check out your pictures, or get your camera out and take a few special shots. There are no prizes – it's just for fun – and you must have taken the pictures you submit yourself. But if your photo is chosen you'll have the thrill of seeing your work in print!

Email your photos to thebeacon@kaust.edu.sa

MY UNIVERSITY

Since their recent arrival on Campus, new graduate students have enjoyed an introduction to Saudi culture. Fasting in the spirit of Ramadan, they took a day trip to Jeddah. They learned a little of local customs en route and each sampled a dab of fragrant Arabian oud, an essential perfume oil. Entering the bustling, old city center Al Balad through the ancient city gate of coral limestone, they were intrigued by the roshan featured in many of the old houses. These architecturally distinct ventilating windows give respite from the fierce summer sun.

ADNAN AL ALAWIYAT

Born and raised in the Eastern Province of Saudi Arabia, Adnan comes to KAUST from the US midwest where he has been since 2002. He completed his first degree in computer science at the University of Minnesota and will be specializing in computer systems for his Master's. Above all, Adnan is "hoping to serve (his) country by advancing education" when he finishes his studies. He was drawn here because of the truly international faculty and graduate student body, and looks forward to sharing the diverse learning and teaching experiences people bring to KAUST.

Adnan is accompanied by his Iraqi-born, American wife, Hawra and their two year-old son, Haidir. It is an added bonus to be back in his homeland and nearer to his extended family. Adnan is still adjusting to the now unfamiliar heat of the Kingdom and looks forward to seeing his wife and son make new friends in the community!

SAWSAN AL HALAWANI

Sawsan, a Jordanian originally from Palestine, has been an undergraduate student at Prince Sultan University in Riyadh. Now studying for her Master's degree in Computer Science, she is excited to see new technologies enhancing daily life and hopes to specialize in visualization. At one time she considered studying medicine and now would like to use her skills in the future in the bio-medical field to improve health. She has a particular interest in the development of pharmaceuticals.

For Sawsan the opportunity to study at KAUST is "a dream come true", and she is delighted by the opportunities for interdisciplinary research that the KAUST structure and facilities offer.

She feels she has been warmly adopted into the community, where she feels safe and happy after just a few days here. She is also looking forward to future family visits.

RENE CLAUS

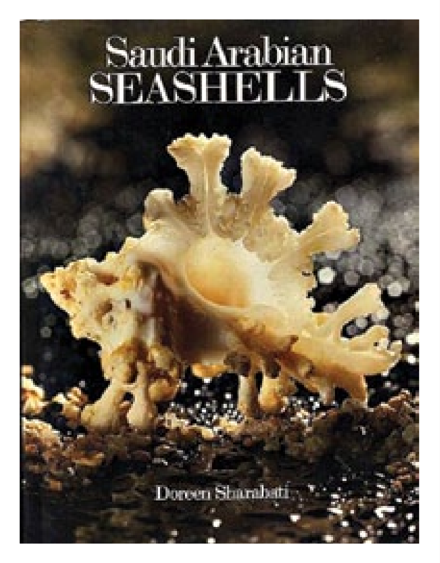
A citizen of both Germany and the US, Rene studied Electrical Engineering and Mathematics - Applied Science at the University of California, San Diego (UCSD). He was one of the first students accepted into the Discovery Scholarship over two years ago while he was a sophomore. He is familiar with the visualization suite here as UCSD helped with its development. The interdisciplinary approach here at KAUST is particularly attractive to Rene, bringing together the many subjects he enjoys. Passionate about electrical engineering, he looks ahead to a future in industry.

He finds the Kingdom's climate (the heat, not the humidity) not dissimilar to California and relishes the opportunities for traveling and meeting diverse people that KAUST offers. He is pleased to be sharing his accommodation with Yousef Basma, a student from Sierra Leone, and is enjoying the new perspective that this opportunity provides.

BOOK REVIEWS

SAUDI ARABIAN SEASHELLS : SELECTED RED SEA AND ARABIAN GULF MOLLUSC

by Doreen Sharabati
(VNU Books International)
KAUST Library Call No. QL 426.S33.S53 1981

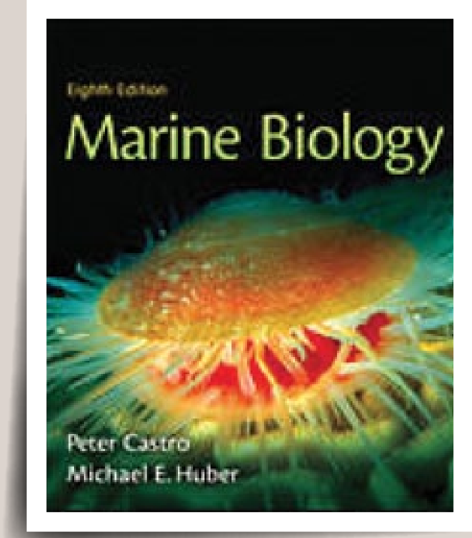


THIS book is one of first and very few to document seashells or marine molluscs from Saudi Arabia. Of interest to both the specialist and general public, the author describes mollusc in simple terms, giving both scientific and common names, and identifying the habitats where they live and the uses that people have found for their shells. As the cover illustrates, this book is full of beautiful color photographs depicting over one hundred species of mollusc.

Whether you are a marine biologist or recreational diver, this is a book worth checking out. It's available in the KAUST Library in the open shelves under its call number.

MARINE BIOLOGY

by Peter Castro, Michael E. Huber
(McGraw Hill, 2010)
Call No. QH 91.C37



THIS basic textbook on marine biology takes a global perspective to its subject, using examples from numerous regions and ecosystems worldwide. It is a fascinating, up-to-date, and beautifully illustrated introduction to the fundamental principles of biology and physical science of marine life. It was a favorite of the library staff who distributed textbooks last year. Its colorful illustrations and photographs and its clear explanations gave us a much better understanding of the Red Sea at our door step. Check it out on the open shelves in the KAUST Library under its call number.